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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,640	11/21/2001	Chien-Wei Li	H0001160	3688

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EXAMINER
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MCNEIL, JENNIFER C

ART UNIT	PAPER NUMBER
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1775

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DATE MAILED: 02/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/990,640

Applicant(s)

LI ET AL.

Examiner

Jennifer McNeil

Art Unit

1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 August 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-12, 15-17, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 9, 13, 14 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2, 3.                      6) ☐ Other: \_\_\_\_\_

Art Unit: 1775

## DETAILED ACTION

### *Claim Objections*

Claim 9 states that the additive is present at a certain range "during application of the coating".

Is this different from what the range would be after the coating is deposited?

Claim 13 is objected to because of the following informalities: line 1 reads " $\text{La}_2\text{O}_3$  is" Please correct the subscript.

Claim 15, line 6, uses the phrase "to a quantity". Should "to" be changed to "with"?

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, 3, 7, and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 states that the additive may be chosen from a group consisting of elements. The specification discloses that the additive may be one or more of other oxides, compounds or their precursors of these elements. It is not clear from the claim and the specification whether applicant is intending the additive to be an oxide, compound, or precursor thereof of these elements, or if the additive is the element. Please clarify. For the purpose of examination, the examiner takes the position that the additive is an oxide, a compound or a precursor thereof of these elements. Claim 3 depends from claim 2 and is therefore rejected.

Art Unit: 1775

Claims 7 and 10 refer to an oxide "based on starting material in the range of". Is the starting material a precursor? Does the range refer to the oxide percentage in the starting material, or is it the range of starting material in the coating. Please clarify.

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, and 4 are rejected under 35 U.S.C. 102(a) as being anticipated by Li et al (US 6,159,553). Li et al teach a coating of silicon nitride whiskers on a silicon nitride substrate. An additional plasma-sprayed layer may be applied, wherein the layer comprises zirconium oxide, tantalum oxide, and mullite (col. 1, lines 50-67).

Claims 1, 2, 4, 5, 8, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Cook (US 3,942,293). Cook teaches a metal oxide coated refractory brick. The coating serves to prolong the life of the brick (col. 2, lines 9-12). The brick may comprise silica or silicon carbide (col. 5, lines 15-20) and the coating may comprise mixtures of refractory oxides selected from the following:  $\text{Al}_2\text{O}_3$ ,  $\text{La}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{Nb}_2\text{O}_5$ , and  $\text{MgO}$  (col. 6, lines 25-40).

Regarding claims 2, 5, and 8, oxides of Al, La, Si, Nb, and Mg would serve as an additive when combined with  $\text{Ta}_2\text{O}_5$ .

Regarding claim 4, as stated above, the substrate or brick may be silicon carbide.

Art Unit: 1775

Claims 1-7, 11, 12, 15-17, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Iwamoto et al (US 4,976,806). Iwamoto et al teach a bonding composition for ceramics comprising a metal oxide melt. The bonding composition comprises CaO, SiO<sub>2</sub> or Al<sub>2</sub>O<sub>3</sub>, and a metal selected from a group that includes Ta<sub>2</sub>O<sub>5</sub>. The bonding composition is coated on a silicon-based substrate.

Regarding claim 3, Iwamoto teaches that silicon nitride may be added to the bonding composition to increase the bond strength (col. 4, lines 49-55).

Regarding claim 4, the substrate may be a silicon nitride that is suitable for use in gas turbine engines (col. 1, lines 22-27).

Regarding claims 2, 5, 11, and 17, SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> are additives in the composition for the coating.

Regarding claims 6, 7, 12, and 17, the amount of alumina that may be added comprises 10-50 wt% of the component, which is considered to overlap with applicant's claimed ranges (col. 3, lines 4-8). R

Regarding claim 15, as taught by Iwamoto in Example 3, the oxides are mixed, heated (melted), and then applied to the substrate. Also, the preamble refers to a method of protecting a silicon nitride or silicon carbide against repeated thermal cycles. The article of Iwamoto may be used in gas turbine settings and it is the examiner's position that while the composition may be used for bonding, it effectively will protect the substrate upon exposure to harsh environments.

Regarding claim 16, the thickness of the layer may be 20-30 microns, which overlaps with applicant's claimed range of 0.5-10 mil (12.7-254 microns) (col. 6, lines 24-26), and the coated layer is calcined at 1500 degrees Celsius. (Example 3).

Regarding claim 20, the mixture may be heated to 1300-1600 degrees Celsius and then pulverized (considered grinding) in a ball mill to obtain a powder (Example 3 and col. 5, lines 36-40).

Claims 1, 2, 5, 6, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsudaira (US 4,670,355). Matsudaira teaches an electroluminescent panel comprising a glass substrate and a layer comprising tantalum pentoxide (Ta<sub>2</sub>O<sub>5</sub>) and aluminum oxide over the glass substrate. The glass

Art Unit: 1775

substrate may be an aluminosilicate glass (col. 2, lines 51-55). The film is deposited by sputtering using a target of titanium oxide and aluminum oxide.

Regarding claims 5-7, the ratio of  $Ta_2O_5$  to  $Al_2O_3$  is between 50:50 to 95:5 by weight (col. 4, lines 55-65). It is the examiner's position that aluminosilicate glass is a silicon-based substrate, in that the substrate contains a higher concentration of silicon in relation to other elements.

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Haluska (US 4,973,526). Haluska teaches coatings on ceramic substrates. The coating material includes silicon oxide and an additional oxide which may include  $Ta_2O_5$  (col. 4, lines 45-50). Example 6 gives a specific embodiment where the substrate is a silicon wafer and the coating is a mixture of silicon oxide and  $Ta_2O_5$ .

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al (US 4,976,806). Iwamoto teaches a bonding composition for ceramics comprising a metal oxide melt. The bonding composition comprises  $CaO$ ,  $SiO_2$  or  $Al_2O_3$ , and a metal selected from a group that includes  $Ta_2O_5$ . Iwamoto teaches mixing the oxides or their precursors, heating the mixture, and pulverization of the mixture, followed by application to the substrate. Iwamoto teaches that the heating may be at temperatures of 1300-1600 degrees Celsius (col. 5, lines 37-68), but does not teach a range of about 1000 degrees Celsius. However, Iwamoto does teach that the temperature may be changed to some extent according to the composition of the powder (col. 5, lines 40-50). Absent a showing of unexpected

Art Unit: 1775

results, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize or adjust the heating temperature for the particular composition used for the bonding, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233).

*Allowable Subject Matter*

Claims 9, 13, 14, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 10 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not teach or render obvious a component comprising a silicon-based substrate, and a protective coating for the substrate, the protective coating including tantalum oxide ( $Ta_2O_5$ ) and an additive for suppressing transformation from beta  $Ta_2O_5$  to alpha  $Ta_2O_5$ , wherein the additive includes  $La_2O_3$  in the range of about 1-10 mol%. The prior art of record does not teach or give motivation to form the specific combination of tantalum pentoxide with lanthanum oxide, where lanthanum oxide is present in the range of 1-10 mol%, applied as a coating on a silicon-based substrate.

Art Unit: 1775

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer McNeil whose telephone number is 703-305-0553. The examiner can normally be reached on Monday through Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 703-308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Jennifer McNeil  
Examiner  
Art Unit 1775

JCM  
January 26, 2003